REMARKS

In the last Office Action, claims 1, 3, 4, 19, 20 and 22-30 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement because the amendment to independent claims 1, 23 and 26 relating to the description of the falling direction of the liquid crystal molecules is not described in the originally-filed specification and introduces new matter into the originally filed disclosure. Claims 1, 3, 4, 19, 20 and 22-30 were further rejected under 35 U.S.C. §103(a) as being unpatentable over applicant's prior art disclosure in Fig. 7 ("APD") in view of U.S. Patent No. 5,917,569 to Tanuma et al. ("Tanuma") and further in view of U.S. Patent No. 5,390,037 to Negishi.

Applicant respectfully traverses the foregoing rejections. As set forth below, the subject matter of each of independent claims 1, 23 and 26 is in full compliance with 37 C.F.R. §112, first paragraph. Furthermore, the combined teachings of APD, Tanuma and Negishi do not disclose or suggest the combination of steps recited in claims 1, 3, 4, 19, 20 and 22-30.

Non-elected claims 11, 13-16 and 18 are being retained in the application pending possible withdrawal of the restriction requirement or allowance of a generic or sub-generic claim. Applicant submits that claims 1, 3, 4, 19-20

and 22-30 are generic to Species A and B identified by the Examiner in the December 10, 2004 Office Action, and it is applicant's understanding that the restriction requirement will be withdrawn upon the allowance of any one of these (or any other) generic claims.

Applicant requests reconsideration of his application in light of the following discussion.

Traversal of Rejection Under
35 U.S.C. §112, First Paragraph

Claims 1, 3, 4, 19, 20 and 22-30 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The Examiner contends that the amendment to independent claims 1, 23 and 26 relating to the falling direction of the liquid crystal molecules is not described in the originally-filed specification and introduces new matter into the originally filed disclosure. Applicant respectfully traverses this contention.

Independent claim 1 recites a fifth step of prescribing a falling direction of molecules of a liquid crystal having a negative dielectric anisotropy in the vertical orientation film, the falling direction being prescribed in parallel with a phase advancing axis or a phase delaying axis of an optical anisotropy of the first flexible polymeric substrate. Independent claims 23 and 26 recite similar steps relating to the flexible polymeric substrate

(claim 23) and the first and second flexible polymeric substrates (claim 26).

Applicant respectfuly submits that the foregoing steps recited in independent claims 1, 23 and 26 are fully supported by the description in the specification as originally filed.

More specifically, page 9, lines 8-15 of the originally-filed specification describe that a flowing direction of the polymeric substrate (i.e., a phase advancing axis or a phase delaying axis of the optical anisotropy of the polymeric substrate) is prescribed in "parallel" to the rubbing or falling direction of the vertical film (i.e., the orientation direction of the liquid crystal molecule on the surface of the polymeric substrate). Page 15, lines 15-19 of the originally-filed specification describe with more specificity the optical anisotropy on the phase advancing axis and the phase delaying axis (i.e., the optical anisotropy in longitudinal and transversal directions of the polymeric substrate).

Thus, the subject matter of each of independent claims 1, 23 and 26 is fully supported by the description in the originally-filed specification. Accordingly, withdrawal of the rejection of claims 1, 23 and 26 under 37 C.F.R. §112, first paragraph, is respectfully requested.

Brief Summary of the Invention

The present invention is directed to a method for manufacturing a liquid display unit.

As described in the specification (pages 1-5), conventional methods for manufacturing liquid crystal display units have been complicated to carry out due to their complexity and low productivity. Additionally, the conventional manufacturing methods have often resulted in damage to a polymeric substrate of the manufactured liquid crystal display unit.

The present invention overcomes the drawbacks of the conventional art. Figs. 1-2 show an embodiment of a method for manufacturing a liquid crystal display unit according to the present invention embodied in the claims. In the manufacturing method, a roll of a flexible polymeric substrate 1 having a longitudinal length longer than a transversal width is provided. Transparent electrodes 2 and a vertical orientation film 3 are then formed on the flexible polymeric substrate 1. The vertical orientation film 3 is then solidified. A falling direction of molecules of a liquid crystal having a negative dielectric anisotropy in the vertical orientation film 3 is then prescribed, the falling direction being prescribed in parallel with a phase advancing axis or a phase delaying axis of an optical anisotropy of the flexible polymeric substrate 1. Thereafter, the flexible

polymeric substrate 1 is connected to an opposed flexible polymeric substrate 4 to define a gap therebetween. A liquid crystal 8 is then disposed in the gap between the flexible polymeric substrates 1, 4.

The flexible polymeric substrate 1 is continuously fed from the roll in the longitudinal direction during the formation of the transparent electrodes 2 and the vertical orientation film 3, during solidification of the vertical orientation film 3, during prescription of the falling direction of liquid crystal molecules in the vertical orientation film 3, and during connection of the flexible polymeric substrates 1, 4.

By the foregoing manufacturing method according to the present invention, the liquid crystal display unit can be manufactured with a simple process by continuously feeding the flexible polymeric substrate from a roll, thereby increasing productivity and avoiding damage to the flexible polymeric substrate. Furthermore, it is sufficient to prescribe the falling direction of the liquid crystal molecules in parallel with a phase advancing axis or a phase delaying axis of an optical anisotropy of the flexible polymeric substrate at any time irrespective of the characteristic specification of a liquid crystal display. By this method, it is possible to assemble upper and lower substrates of the liquid crystal display unit such that the orientation directions of the

substrates are opposed to each other while the elongated substrates are used as they are. Therefore, the liquid crystal unit of the polymeric substrate can be manufactured with high productivity.

Traversal of Prior Art Rejection

Claims 1, 3, 4, 19, 20 and 22-30 were rejected under 35 U.S.C. §103(a) as being unpatentable over APD in view of Tanuma and further in view of Negishi. Applicant respectfully traverses this rejection and submits that the combined teachings of APD, Tanuma and Negishi do not disclose or suggest the subject matter recited in independent claims 1, 23 and 26 and corresponding dependent claims 3, 4, 19, 20, 22, 24, 25 and 27-30.

Independent claim 1 is directed a manufacturing method of a liquid crystal display unit and requires a step (i.e., third step) of forming a vertical orientation film on the first flexible polymeric substrate, and a step (i.e., fifth step) of prescribing a falling direction of molecules of a liquid crystal having a negative dielectric anisotropy in the vertical orientation film, the falling direction being prescribed in parallel with a phase advancing axis or a phase delaying axis of an optical anisotropy of the first flexible polymeric substrate. Claim 1 further requires that the first flexible polymeric substrate is continuously fed from the roll

in the longitudinal direction during the second through sixth steps recited in claim 1. No corresponding combination of steps is disclosed or suggested by the combined teachings of APD, Tanuma and Nigishi.

APD discloses a method of manufacturing a liquid crystal display unit including steps of forming a polymeric substrate and transparent electrodes, the formation and solidification of an orientation film, and an orientation step for liquid crystal molecules in the orientation film. However, as recognized by the Examiner, APD does not disclose or suggest the formation of an orientation film which is vertically aligned, as recited in claim 1. Likewise, APD clearly does not disclose or suggest that the polymeric substrate is a flexible polymeric substrate that is continuously fed from a roll in the longitudinal direction during the second through sixth steps recited in claim 1.

Moreover, as further recognized by the Examiner, APD does not disclose or suggest a step of prescribing a falling direction of molecules of a liquid crystal having a negative dielectric anisotropy in the vertical orientation film, the falling direction being prescribed in parallel with a phase advancing axis or a phase delaying axis of an optical anisotropy of the first flexible polymeric substrate, as recited in independent claim 1.

The Examiner contends that secondary reference to Tanuma teaches the formation of an orientation film which is vertically aligned, as recited in claim 1. The Examiner therefore concludes that the selection of a vertically aligned orientation film in the method disclosed by APD would have been obvious to one of ordinary skill in the art at the time the invention was made. Applicant respectfully disagrees with the Examiner's contention and conclusion of obviousness.

Tanuma discloses a process for forming an orientation film by moving a substrate. More specifically, as shown in Figs. 12(a)-(c) of Tanuma, an alignment film 25A is rubbed to orient main axes of a plurality of liquid crystal molecules placed on the alignment film 25A toward the same axial direction (col. 15, lines 7-18). The alignment film 25A is rubbed using a rubbing roll 21 while a substrate 11 is moved relative to the rubbing roll via a stage 22. Contrary to the Examiner's contention, there is no teaching in Tanuma that this procedure imparts a vertical alignment mode to the liquid crystal molecules. Stated otherwise, Tanuma discloses a twisted-mematic mode, not a vertical orientation mode.

Furthermore, Fig. 11b in Tanuma and the corresponding description in the specification disclose that an induction electric field existing between a pixel electrode 13 and a scanning bus line 14 results in an abnormal region of the alignment film by which liquid crystal molecules of the

alignment film are easily influenced such that the liquid crystal molecules are in a stand-up state by an impressed voltage (col. 8, lines 18-26; col. 19, lines 18-52). Thus, Tanuma does not disclose or suggest the formation of a vertical orientation film, i.e., an LCD showing a vertical orientation without an impressed voltage, as required by independent claim 1.

Likewise, Tanuma does not disclose or suggest a flexible polymeric substrate that is continuously fed from a roll in the longitudinal direction from the third step of forming a vertical orientation film through the sixth step in which the flexible polymeric substrate is connected to another flexible polymeric substrate, as required by independent claim 1.

Furthermore, Tanuma does not disclose or suggest a step of prescribing a falling direction of molecules of a liquid crystal having a negative dielectric anisotropy in the vertical orientation film, the falling direction being prescribed in parallel with a phase advancing axis or a phase delaying axis of an optical anisotropy of the first flexible polymeric substrate, as recited in independent claim 1. In this regard, while disclosing a process for forming an orientation film by moving a substrate, Tanuma discloses only a twisted-nematic mode, not a vertical orientation mode. Again, Fig. 11b of Tanuma discloses an induction electric

field between pixel electrode 13 and line 14 resulting in an abnormal orientation region. Thus, the falling direction of liquid crystal molecules disclosed by Tanuma does not have the specific parallel orientation relative to a phase advancing axis or a phase delaying axis of the optical anisotropy of a flexible polymeric substrate, as required by independent claim 1.

The reference to Negishi discloses a process for forming an orientation film by continuously conveying a film substrate between a rubbing roll 13a and a backup roll. During the rubbing process, the rubbing roll 13a has a rubbing angle relative to a longitudinal direction of the film substrate. This rubbing angle varies according to a characteristic of a liquid crystal. However, Negishi does not address the specific vertical orientation film and prescribed falling direction of the liquid crystal molecules recited independent claim 1.

Furthermore, while disclosing the formation of the orientation film by continuously conveying the film substrate between a rubbing roll and a backup roll, Negishi does not disclose or suggest the "continuous" feeding process of the roll in the longitudinal direction during each of the second through sixth steps (i.e., from the step of forming a vertical orientation film through the step of connecting

first and second flexible polymeric substrates together), as recited in independent claim 1.

Since Tanuma and Negishi do not disclose or suggest the foregoing steps recited in independent claim 1, they do not cure the deficiencies of APD. Accordingly, one ordinarily skilled in the art would not have been led to modify the references to attain the claimed subject matter.

Independent claim 23 requires the steps of continuously feeding the flexible polymeric substrate from the roll in the longitudinal direction while sequentially forming a vertical orientation film on the flexible polymeric substrate, solidifying the vertical orientation film, and prescribing a falling direction of liquid crystal molecules in the vertical orientation film so that the falling direction is prescribed in parallel with a phase advancing axis or a phase delaying axis of an optical anisotropy of the flexible polymeric substrate. Independent claim 26 requires a similar sequence of steps with respect to each of the first and second flexible polymeric substrates of the liquid crystal display unit. No corresponding steps are disclosed or suggested by the combined teachings of APD, Tanuma and Negishi as set forth above for independent claim 1.

Claims 3, 4, 19, 20, 22, and 24, 25 and 27-30 depend on and contain all of the limitations of independent claims 1, 23 and 26, respectively, and, therefore, distinguish from the cited references at least in the same manner as claims 1, 23 and 26.

In view of the foregoing, applicant respectfully requests that the rejection of claims 1, 3, 4, 19, 20 and 22-30 under 35 U.S.C. §103(a) as being unpatentable over APD in view of Tanuma and further in view of Negishi be withdrawn.

In view of the foregoing amendments and discussion, the application is believed to be in allowable form. Accordingly, favorable reconsideration and allowance of the claims are most respectfully requested.

Respectfully submitted,

ADAMS & WILKS
Attorneys for Applicant

By: _____
Bruce L. Adams
Reg. No. 25,386

17 Battery Place
Suite 1231
New York, NY 10004
(212) 809-3700

MAILING CERTIFICATE

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Mail Stop AMENDMENT, COMMISSIONER FOR PATENTS, P.O. Box 1450, Alexandria, VA 22313-1450, on the date indicated below.

Thomas Tolve
Name

_____
Signature

December 19, 2006
Date